MCDA-208/WC106

Ultra-Low-Jitter Studio Master Clock with Dual 1x4 AES/EBU Distribution Amplifier and 1x6 Clock Distribution Amplifier

OPERATING AND MAINTENANCE MANUAL

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Day Sequerra | 154 Cooper Rd. #902 | W. Berlin, NJ 08091 | Voice 856-719-9900 | sales@daysequerra.com | www.atiaudio.com

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MCDA-208/WC106 FEATURES

- Switchable for use as Master Clock source or 1X6 Clock DA
- Accepts AES3, S/PDIF, AES11, and Word Clock inputs
- Independent Dual 1X4 AES/EBU Distribution Amplifiers
- Generates standard sample rates of 44.1, 48, 88.2, 96, 176.4 or 192 kHz
- Displays input sample rates of 32, 44.1, 48, 88.2, 96, 176.4 and 192 kHz
- Divide-Down ultra-low jitter clock with exceptional stability
- Full diagnostics for all inputs and operating conditions
- Loop-thru inputs for AES External Sync and Word Clock
- Switchable input termination for all inputs
- 6 independently driven 75-ohm BNC Word Clock outputs; 8 isolated AES/EBU 110 Ohm XLR outputs
- Flexible signal routing system
- Automatic and manual external sync and internal sync generator functions
- Switchable Input Re-clocking on all AES/EBU inputs
- Automatic Input Equalization for long input lines
- Front panel control locking system

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Specifications subject to change.

SAFETY INFORMATION

To reduce risk of electric shock, do not remove covers. There are no user-serviceable items inside. Please refer servicing to qualified personnel.

UNPACKING

Examine all shipping cartons for external damage and retain all damaged cartons for inspection by the carrier. Examine all equipment for any sign of damage. Do not connect AC mains power to a unit which appears to be damaged. Contact the carrier to file a damage claim.

INSTALLATION LOCATION

This equipment must be installed in a location meeting the environmental conditions specified below. Adequate cooling must be provided if units are to be operated in high temperature locations. Exposure to liquid and condensation must be avoided.

GROUNDING

This equipment is connected to earth through the center conductor of the AC mains cable. Proper grounding protects operators from electric shock, and it must be maintained whenever the unit is connected to AC.

ELECTROMAGNETIC COMPATIBILITY

This unit complies with electromagnetic requirements described in EMC Directive 2004/108/EC and FCC Part 15. This unit does not generate undue electromagnetic interference, and is adequately protected against electromagnetic interference so that it can operate properly.

MAINTENANCE

This unit requires no maintenance other than periodic wiping with a soft dry cloth to remove any dust or contaminating substances. Do not use solvents for cleaning.

DECLARATIONS OF CONFORMITY

Class A Equipment – FCC Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to FCC CFR 47, Part 15.

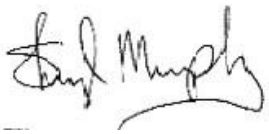
CE Declaration of Conformity

ATI Audio Inc., West Berlin, New Jersey 08091 USA, declares that all Model MCDA-208/WC106 units are in conformity with the following EU regulations and amendments:

Low Voltage Directive (LVD) 2006/95/EC (replaces 73/23/EEC)
Electromagnetic Compatibility (EMC): EMC Directive 2004/108/EC
EMC: EN55103-1/-2:2009, electromagnetic environments E2.
Safety: EN 60950:2006

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

West Berlin, NJ USA, 31 July 2009



President

AIR TEMPERATURE AND HUMIDITY
Normal operation of this unit is warranted while operating in a temperature range of +5 to +40°C, with relative humidity ranging from 5 to 85%. Care should be taken to avoid operation outside these limits or erratic operation may result.

FUNCTIONAL STANDARDS
All Model MCDA-208/WC106 units are in conformity with the following industry standards:
AES3-2003, AES11-2003 and IEC958 SPDIF

DESCRIPTION

The ATI Model MCDA-208/WC106 is an integrated package containing an ultra-low jitter studio master clock generator, two 1X4 AES/EBU Digital Audio Distribution Amplifiers and one 1X6 Clock Distribution Amplifier. Operation of the unit is simple and straightforward, and it is housed in a rugged 2U rack mount enclosure. All audio connections are made directly to the unit's built-in XLR and BNC connectors, and no special breakout cables or accessory jack panels are required.

When used as a studio master clock, the MCDA can generate an exceptionally stable 44.1, 48, 88.2, 96, 176.4 or 192 kHz clock reference for the purpose of synchronizing all of your connected digital equipment. This single clock source assures a trouble-free digital workflow throughout your digital facility. The output clock format can be either Word Clock or Super Word Clock, and this signal is available on all six of the MCDA's individually driven BNC outputs. The Clock Generator output can also be routed to either or both AES/EBU XLR output groups.

If you prefer to use another source for your reference clock, the MCDA can function as a 1X6 Clock Distribution Amplifier. It can accept an AES3 audio signal or an AES Word Clock as an input, and will output either Word Clock or Super Word Clock from its six BNC output connectors. These reference clock signals can also be routed to either or both AES/EBU XLR output groups as word clock.

The Clock Generator section provides automatic switchover. Failure of an external clock will cause the Clock Generator to automatically generate its own preprogrammed reference signal. Internal clock can also be selected manually.

Since the purity of the clock reference is critical to the quality of the finished audio product, ATI has taken steps to assure that the MCDA generates the lowest jitter clock reference available. The MCDA's internal reference is derived from a 24 MHz precision oscillator and divided down to achieve an ultra-stable signal, rather than multiplying up from a base reference as in some other units.

The MCDA's Clock Distribution Amplifier has both Input and Loop-thru outputs to allow downstream equipment to be fed from the input reference signal. When no downstream equipment is connected, the inputs should be terminated via the front panel Input Termination switch.

When fed from an external reference signal, the MCDA will indicate the clock frequency of the input signal from 32 through 192 kHz. The full diagnostics front panel will also indicate Word Length, Digital Errors if any, and whether the digital stream is Pro or Consumer mode. These diagnostic indicators are switchable to display these details for either AES/EBU input, or for the AES External Sync In or Word Clock input.

The MCDA can also derive a Frame Clock (Word Clock) from the AES/EBU signal input to AES Input 1. This Frame Clock signal is available for routing to all XLR and BNC outputs.

Input 1, AES SYNC IN, and WORD CLOCK IN will lock to AES3, AES11 or Word Clock. AES SYNC IN, and WORD CLOCK IN generate “Word Clocks” to be outputted.

Alarm LEDs located on the left side of the front panel indicates loss of carrier occurring on any input, regardless of the position of the Source Monitor selector.

A front panel lock switch protects all settings. The MCDA retains all of its settings, even if power is removed.

INPUTS
Incoming AES/EBU formatted digital audio data, AES11 or Word Clock is applied to individual input transformers. Input termination resistors at 75 ohms for BNC inputs or 110 ohms for XLR inputs can be switched in or out of the circuit with the front panel Input Term switch. Inputs should always be terminated unless they are looped through to another device or a second MCDA input.

OUTPUTS
The MCDA has eight balanced, transformer driven XLR outputs arranged in groups of four; i.e., 1 through 4 and 5 through 8. It also has six isolated BNC outputs which function as a single group. Rear panel mounted DIP switches allow you to configure the MCDA to send the following signals to any or all of these three groups of outputs:

1. INPUT 1 AES/EBU
2. INPUT 2 AES/EBU
3. AES SYNC-IN AES/EBU derived Word Clock
4. WORD CLOCK INPUT External Word Clock
5. Internal Clock Generator
6. INPUT 1 AES/EBU derived Frame Clock

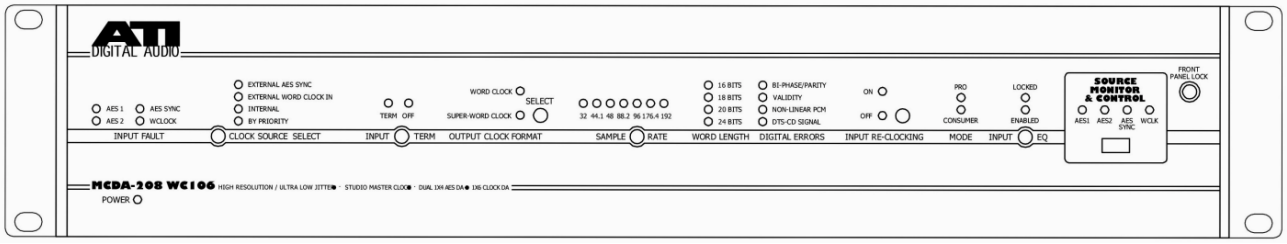
It is not necessary to terminate unused outputs, as each is individually isolated.

POWER
Connector for socket fused IEC 320/C13. Power cord is supplied. The MCDA has a rear panel On Off power switch.

POWER INPUT SPECIFICATIONS:

Voltage .....85 ~ 264Vac
Frequency .....47 to 63Hz

FRONT PANEL DISPLAYS AND SWITCHES



POWER
Indicates that the MCDA is powered and power switch is on.

INPUT FAULT
Indicates loss of carrier on any of the four inputs, INPUT 1 (AES 1), INPUT 2 (AES 2), AES SYNC-IN (AES SYNC) or WORD CLOCK INPUT (WCLK).

CLOCK SOURCE SELECT
Selects timing reference source for clock generator. Sequentially pressing the Clock Source Select button selects from External AES Sync (AES SYNC-IN), External Word Clock Input (WORD CLOCK INPUT), or Internal crystal reference. An additional button press illuminates the BY PRIORITY LED and enables automatic priority selection of timing reference source in the order: AES External Sync, External Word Clock In, or Internal. Selection is enabled only when Source Monitor & Control WCLK LED is on.

INPUT TERM
Indicates whether the input termination is on or off for the source selected by the Source Monitor & Control switch. Press the INPUT TERM button to toggle the setting. Settings are individual for each source selected, and are memorized and retained through power outages.

OUTPUT CLOCK FORMAT
Indicates either Word Clock or Super Word Clock format available at outputs. Press the SELECT button to toggle the setting. Enabled only when WCLK LED is on.

SAMPLE RATE
When Clock Source Select switch is set to INTERNAL and the WCLK LED is on, the SAMPLE RATE switch selects the internal generator sample rate. For manual Word Clock sample rate selection, set Source Monitor & Control to WCLK LED on. When the Clock Source switch is set to EXTERNAL AES SYNC or EXTERNAL WORD CLOCK IN, the LEDs indicate the sample rate of the external input from 32 kHz through 192 kHz.

WORD LENGTH
Indicates the Word Length of the input signal from 16 through 24 bit.

DIGITAL ERRORS
Indicates four error conditions encountered in digital signals as an aid to troubleshooting: Bi-Phase/Parity, Validity, Non-Linear PCM and DTS-CD Signal.

INPUT RE-CLOCKING
Indicates Input Re-Clocking is On or Off. Press the RE-CLOCKING button to toggle the setting. Note that this function applies only to the AES/EBU inputs and does not affect the AES External Sync and Word Clock inputs. Settings are individual for either INPUT 1 (AES 1) or INPUT 2 (AES 2). , and are memorized and retained through power outages.

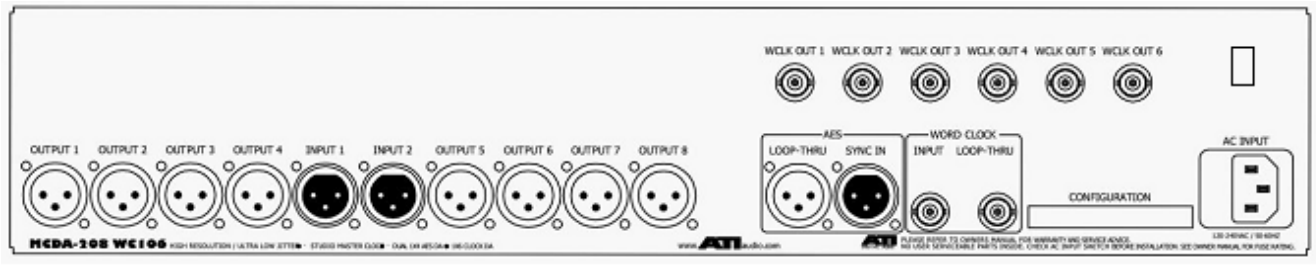
MODE
Indicates whether incoming AES/EBU input signal is Pro or Consumer mode.

INPUT EQ
Enables automatic input equalization for long input cables. LOCKED indicates input data is present and acceptable. ENABLED indicates equalization is applied. Press the INPUT EQ button to enable automatic equalization. Settings are memorized and retained through power outages. Jitter may be reduced even more when used in conjunction with re-clocking.

SOURCE MONITOR & CONTROL
Selects the input source to be monitored and/or controlled; either INPUT 1 (AES 1), INPUT 2 (AES 2), AES SYNC-IN (AES SYNC) or WORD CLOCK INPUT (WCLK). Internal Generator settings are made when WCLK selected. To monitor an input signal, use Source Monitor Select to determine error details by selecting particular input.

FRONT PANEL LOCK
The Front Panel Lock protects your front panel settings. Press and hold the FRONT PANEL LOCK button to lock all the front panel controls. Press and hold again to unlock.

REAR PANEL CONNECTIONS AND SWITCHES



AES/EBU INPUT 1
Provides a balanced, transformer isolated 110 ohm AES/EBU input that may be routed to XLR Outputs 1 through 4, Outputs 5 through 8 or BNC Outputs 1 through 6 via the configuration DIP switches. A Frame Clock (Word Clock) is derived from this input, which may be routed to any or all output groups.

AES/EBU INPUT 2
Provides a balanced, transformer isolated 110 ohm AES/EBU input that may be routed to XLR Outputs 1 through 4, Outputs 5 through 8 or BNC Outputs 1 through 6 via the configuration DIP switches.

AES SYNC IN
Provides a balanced, transformer isolated 110 ohm AES Sync input that a derived Word Clock may be routed to XLR Outputs 1 through 4, Outputs 5 through 8 or BNC Outputs 1 through 6 via the configuration DIP switches. A Frame Clock is derived from this input. When present, this signal provides first priority for synchronizing the internal Clock Generator when CLOCK SOURCE SET is set to BY PRIORITY.

AES LOOP-THRU
Provides a convenient loop-thru port for the AES External Sync input. When looping this signal to another device, set Input Termination to Off.

WORD CLOCK INPUT
Provides an isolated high impedance or 75 ohm Word Clock input to synchronize the internal Clock Generator. It may be routed to XLR Outputs 1 through 4, Outputs 5 through 8 and/or BNC Outputs 1 through 6 via the configuration DIP switches. When present, this signal provides the second priority for synchronizing the internal Clock Generator when CLOCK SOURCE SET is set to BY PRIORITY.

WORD CLOCK LOOP-THRU
Provides a convenient loop-thru port for the Word Clock input. When looping this signal to another device, set Input Termination to Off.

CONFIGURATION DIP SWITCHES

Provides routing and other selections for signal flow in the unit. See the DIP Switch Routing Table for settings:

The switches are labeled left to right BANK A switch “1” is “DIP Switch 1 in the following tables. DIP Switches 7 through 12 have no function in the MCDA-208/WC106. In this view Outputs 1-4 are connected to input 1. OUTPUT 5 to 8 are connected to Word Clock generated by the WORD CLOCK INPUT. The WCLK OUT 1 through 6 are connected the internal clock generator.

SOURCE SELECTION FOR AES/EBU OUTPUTS 1, 2, 3 & 4

Selected Source →	AES/EBU INPUT 1	AES/EBU INPUT 2	EXT AES SYNC INPUT	WORD CLOCK INPUT		AES 1 FRAME CLOCK
DIP Switch 1	Down	Up	Down	Up		Up
DIP Switch 2	Down	Down	Down	Down		Up
DIP Switch 3	Down	Down	Up	Up		Up

SOURCE SELECTION FOR AES/EBU OUTPUTS 5, 6,7 & 8

Selected Source →	AES/EBU INPUT 1	AES/EBU INPUT 2	EXT AES SYNC INPUT	WORD CLOCK INPUT		AES 1 FRAME CLOCK
DIP Switch 4	Down	Up	Down	Up		Up
DIP Switch 5	Down	Down	Down	Down		Up
DIP Switch 6	Down	Down	Up	Up		Up

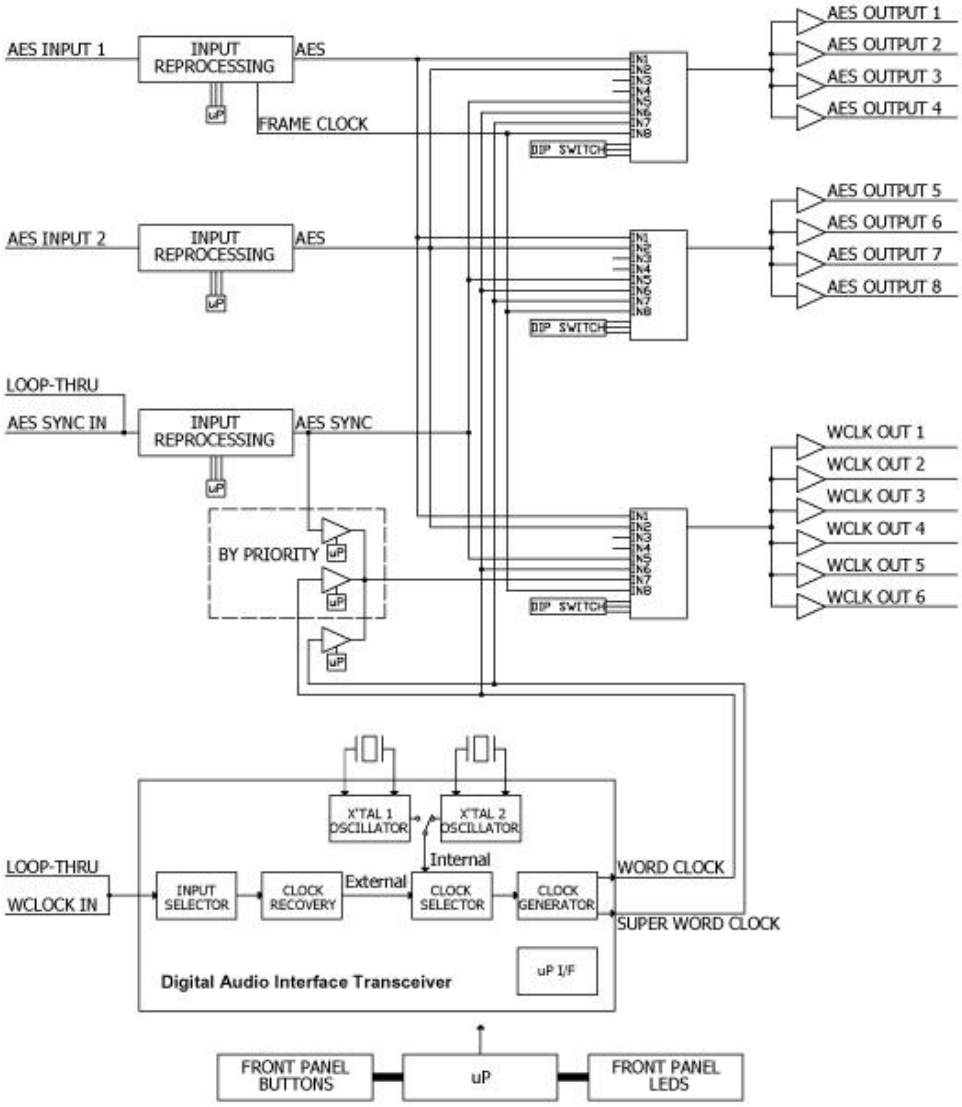
SOURCE SELECTION FOR WORD CLOCK OUTPUTS

Selected Source →	AES/EBU INPUT 1	AES/EBU INPUT 2	EXT AES SYNC INPUT	WORD CLOCK INPUT	INT CLOCK GEN Note 1	AES 1 FRAME CLOCK
DIP Switch 13	Down	Up	Down	Up	Down	Up
DIP Switch 14	Down	Down	Down	Down	Up	Up
DIP Switch 15	Down	Down	Up	Up	Up	Up

Notes:

1. For “BY PRIORITY CLOCK”, DIP switch 13 through 15 must be set to this group of positions to permit use of the internal clock generator and the automatic priority function, as configured by the front panel switches.

MCDA-204 WC106 BLOCK DIAGRAM



Input processing includes transformer isolation, cable termination, cable equalization, and AES digital audio interface receiver (DIR) and digital audio interface transmission (DIT). The output of each input signal processor is routed to a multiplexing chip which allows connection to each of the three output groups. Selection is controlled by the position of the configuration switches on the back panel of the MCDA. Each output port is driven by its own driver preventing interaction between outputs. Two separate highly accurate crystal clock sources allow the MCDA to achieve frame rates accurate to less than 1 part per million. A microprocessor sets up the MCDA for operation.

Super Word Clock is a bit clock like signal that is exactly 256 times the frequency of the associated frame rate for sample rates up to 96 k samples per second or 128 times for rates above 96 k samples.

INSTALLATION

LOCATION

The MCDA is readily installed into a 2 RU, 19” rack. The MCDA is only to be installed in an inside location where it is protected from inclement weather. Operate the MCDA in temperature range of +5 to +40°C (105°F), with relative humidity ranging from 5 to 85%.

POWER

Connector for socket fused IEC 320/C13. Power cord is supplied. The MCDA has a rear panel On Off power switch.

POWER INPUT SPECIFICATIONS:

Voltage .....85 ~ 264Vac
Frequency .....47 to 63Hz

This equipment is connected to earth through the center conductor of the AC mains cable. Proper grounding protects user/operators from electric shock, and it must be maintained whenever the unit is connected to AC.

WIRING

XLR inputs for external clock sources require special controlled impedance, 110 ohm, low loss, foil shielded, twisted pair cables. Standard audio cable is not recommended. Belden and most other cable manufacturers offer special digital audio cabling for this application. BNC connectors use 75-ohm coax (RG59). Select a cable for losses less than 20dB at 12MHz (for data rates up to 96 k samples) at the maximum distance you require. Keep cable length as short as possible, especially when working with Super Word clock rates.

MCDA-208/WC106 SPECIFICATIONS

INPUTS	
CONNECTORS	XLR female for AES/EBU and AES External Sync BNC for Word Clock
LEVEL	XLR 200mVp-p minimum; BNC 1 Vp-p
IMPEDANCE	Transformer isolated, balanced and floating, XLR 110Ω, BNC 75 Ω; input terminations may be switched in or out via front panel control
CLOCK	Locked, filtered and reconstructed from external input signals with exceptionally stable PLLs less than 800ps jitter.
SYNC FREQUENCY	30 to 200 kHz
OUTPUTS	
AES/EBU OUT CONNECTORS	8 x XLR
LEVEL	5 Vp-p loaded at 110Ω
IMPEDANCE	110Ω
JITTER	< 800 picoseconds
CLOCK OUT CONNECTORS	6 x BNC
LEVEL	2 Vp-p loaded with 75Ω
IMPEDANCE	75Ω, unbalanced
LOOP-THRU	XLR-M and BNC
INTERNALLY GENERATED WORD CLOCK	Sample rate accuracy of ±1 ppm
INDICATORS	
INPUT FAULT	AES, Word Clock or Super-Word Clock
CLOCK SOURCE SELECT	AES External Sync, External Word Clock In, Internal, By Priority
INPUT TERMINATION	Terminated or Off
OUTPUT CLOCK FORMAT	Word Clock or Super-Word Clock
SAMPLE RATE	32, 44.1, 48. 88.2, 96, 176.4 or 192 kHz
WORD LENGTH	16 Bits, 18 Bits, 20 Bits and 24 Bits
DIGITAL ERRORS	Bi-Phase Parity, Validity, Non-Linear PCM and DTS-CD Signal
INPUT RE-CLOCKING	On and Off
MODE	Pro and Consumer
INPUT EQ	Locked and Enabled
SOURCE MONITOR & CONTROL	AES 1, AES 2, AES External Sync, Word Clock
POWER	Internal Supply, 115/230VAC ±10%, 50/60Hz, 10VA, IEC320 3 pin connector
SIZE	2 RU Package, 19” (48.3cm) W x 3.5“ (8.9cm) H x 8.5” (21.6cm) D
WEIGHT	9 pounds (4.1 kg) net; 10 pounds (4.5 kg) shipping weight
WARRANTY	Limited, One Year Warranty

Specifications are subject to change without notice to upgrade the performance of our products.

One Year Limited Warranty

DaySequerra warrants ATI products to be free from defects in materials and workmanship to its original owner for one (1) year from the date of purchase. DaySequerra will repair or replace such product or part thereof that upon inspection by DaySequerra, is found to be defective in materials or workmanship subject to conditions contained herein.

ATI products are sold worldwide, through a network of authorized ATI dealers and distributors. This Warranty is for the sole benefit of the original purchaser of an ATI product, purchased directly from an authorized ATI dealer or distributor, is restricted to such original purchaser, and shall not be transferred to a subsequent purchaser of the product. Proof of purchase in the form of a bill of sale or receipted invoice substantiating that the product was purchased directly from an authorized ATI dealer or distributor and is within the warranty period must be presented to obtain warranty service. Removal or alteration of the original ATI serial number from a product automatically renders that product warranty null and void.

A Return Authorization Number must be obtained from DaySequerra in advance of return. Parts or product for which replacement is made shall become the property of DaySequerra. The customer shall be responsible for all costs of transportation and insurance to and from the DaySequerra factory, and all such costs will be prepaid.

DaySequerra shall use reasonable efforts to repair or replace any product covered by this limited warranty within thirty days of receipt. In the event repair or replacement shall require more than thirty days, DaySequerra shall notify the customer accordingly. DaySequerra reserves the right to replace any product that has been discontinued from its product line with a new product of comparable value and function.

This warranty shall be void in the event a covered product has been damaged, or failure is caused by or attributable to acts of God, abuse, accident, misuse, improper or abnormal usage, failure to follow instructions, improper installation or maintenance, alteration, or lightning, power fluctuations and other incidental or environmental conditions. Further, product malfunction or deterioration due to normal wear is not covered by this warranty.

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DaySequerra
154 Cooper Road, Building 902
West Berlin, NJ 08091

For more information, please call 856-719-9900, visit www.atiaudio.com or email us at support@daysequerra.com.